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(54) **PRINTING MACHINE AND PRINTING GROUP FOR VARIABLE FORMAT OFFSET**

DRUCKMASCHINE UND DRUCKGRUPPE FÜR OFFSET MIT VARIABLEM FORMAT

MACHINE D'IMPRESSION ET GROUPE D'IMPRESSION POUR OFFSET À FORMAT VARIABLE

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Description

Technical Field

[0001] The present invention relates to a printing machine and a printing group for wet, dry or waterless variable format offset with a central printing drum in a fixed position, comprising at least one offset printing group arranged for printing on a substrate in the form of continuous band. Said offset printing group is prepared to be readily converted into a flexographic printing group. Thus, according to the present invention a printing machine can be formed from several of such printing groups for printing on a substrate in the form of continuous band either by means of wet, dry or waterless offset or by flexography, or a combination of offset and flexography, and with a variety of formats.

Background of the Invention

[0002] The patent application EP-A-0027321 describes a printing machine for variable format offset wherein have been provided two structures articulated rotationally about a shaft supporting the plate and printer rollers and a fixed structure on which the rubber-wrapped blanket is exchanged.

[0003] The European patent EP-A-1101611 relates to a device for supporting and exchanging in variable position with respect to the fixed position ink head, at least one of the plate, rubber-wrapped blanket and printer rollers in an offset printing press wherein the variable position elements are provided with arms which are rotatable about respective shafts, comprising the positioning means for positioning actuating means to rotate said support arms.

[0004] The European patent application EP-A-1 932 667 describes a printing machine for variable format offset wherein the offset inking head and the plate roller are integrated in a unit which is linearly or rotationally displaced together, separating it from the rubber-wrapped blanket roller, to allow changing said plate and rubber-wrapped blanket rollers and, if necessary, changing format.

[0005] Document DE 20011699 U1 discloses a variable format offset printing machine having a central printing drum and a plurality of printing groups arranged to print on a web substrate supported on said central printing drum. Each printing group comprises a support structure to which a linear guide system is fixed, said linear guide system being arranged to guide the movements of first, second and third carriages carrying an offset rubber-wrapped blanket roller or sleeve, an offset plate roller or sleeve, and an offset inking head, respectively. The individual support structures of the printing groups are separated from one another, attached to a common support structure of the printing machine, and positioned around the central printing drum in different inclinations such that the movements of the first, second and third carriages are carried out in respective radial directions,

[0006] Document EP 1080888 A1 discloses a flexographic or other type printing machine having a plurality of printing groups, with each printing group having a linear guide system fixed to an individual support structure and arranged to guide the movements of first, second and third carriages carrying a flexographic plate roller or sleeve, a flexographic anilox roller or sleeve, and a flexographic inking device, respectively, in a common horizontal direction. The individual support structures of the printing groups are separated from one another and attached to a common support structure of the printing machine around a central printing drum supported thereon.

[0007] The present application offers an alternative solution for changing format, based on printing groups configured as modular units provided to be operatively associated to a fixed position central printing drum, wherein the rubber-wrapped blanket roller, the plate roller and the offset inking head of each printing group are installed on respective support carriages displaced linearly in a horizontal direction.

Disclosure of the Invention

[0008] According to a first aspect, the present invention provides a printing machine for variable format offset according to claim 1. The printing machine incorporates one central printing drum in a fixed position, and a plurality of printing groups each comprising a support structure to which a linear guide system is fixed. Said support structures of the printing groups are located in fixed positions in relation with said central printing drum. Each printing group comprises three carriages arranged to be displaced along said linear guide system. The first of said carriages is provided with supports to hold a first shaft configured for receiving a rubber-wrapped blanket roller or sleeve selected from a set of rubber-wrapped blanket rollers or sleeves of different sizes. The second of the carriages is provided with supports to hold a second shaft configured for receiving a plate roller or sleeve selected from a set of plate rollers or sleeves of different sizes. On the third of the carriages an offset inking head is installed, which is provided with a plurality of ink-supplying rollers and with devices for approximating said third carriage to said plate roller or sleeve installed in said second shaft, identifying and fixing the working position thereof in relation with the plate roller or sleeve and fitting all the mentioned ink-supplying rollers to the perimeter of the plate roller or sleeve.

[0009] This construction allows selectively installing rubber-wrapped blanket rollers or sleeves and plate rollers or sleeves of different sizes for different printing formats ranging between a minimum format and a maximum format. The three carriages are arranged to run in a horizontal direction on common guide elements, and the first and second carriages are moved by respective nut and screw systems actuated by independent motors. The third carriage is moved by one or more linear actuators.

The horizontal arrangement of the guide elements is preferred because with it, the requirements of the actuation devices are minimized, taking into account the high weight of the offset inking unit, which allows, for example, using pneumatic actuating actuators for displacing the third carriage.

[0010] The plurality of ink-supplying rollers of the offset inking head comprise between them a central ink-supplying roller assembled in a central pivoting support connected to a central linear actuator arranged to push said central pivoting support until contacting and pressing said central ink-supplying roller against the plate roller or sleeve. The ink-supplying rollers further comprise upper and lower ink-supplying rollers assembled in respective pivoting supports connected to linear actuators arranged to push the upper and lower pivoting supports until pressing said upper and lower ink-supplying rollers against the plate roller or sleeve.

[0011] The mentioned first and second shafts supported respectively in the first and second carriages are further configured for receiving, respectively, a plate cylinder roller or sleeve and a screen roller or sleeve suitable for flexographic printing substituting the respective rubber-wrapped blanket roller or sleeve and plate roller or sleeve suitable for offset printing. Furthermore, the displacement device of the third carriage is configured to separate the offset inking head from the second shaft a sufficient distance to allow installing a flexographic inking unit operatively associated to a screen roller or sleeve installed in the second shaft, whereby the offset printing group is converted into a flexographic printing group. Obviously, the first shaft accepts plate cylinder rollers or sleeves of different sizes from a minimum format to a maximum format. Although the second shaft is also prepared for accepting screen rollers or sleeves of different sizes, installing screen rollers or sleeves of a constant size is preferred since in the flexographic system the diameter of the screen roller or sleeve does not influence the format, which is exclusively defined by the plate cylinder roller or sleeve. The installation of screen rollers or sleeves of a constant diameter makes providing guide, support and fixation elements easier for installing the flexographic printing group in the second carriage in a position adjacent to the second shaft.

[0012] The technical principles on which the present invention is based allow constructing printing machines provided with multiple printing groups arranged around a single central printing drum common for all of them for printing on a substrate in the form of continuous band supported dynamically on the central printing drum. A single central printing drum common for all the printing groups is the most favorable configuration when the substrate in the form of continuous band is prone to deformations by stretching.

[0013] According to a second aspect, the present invention provides a printing group for variable format offset printing according to claim 10. The printing group is adopting the shape of a printer module with the characteristics of the printing group described above. The printing group of the present invention comprises a support structure including two facing walls arranged in opposite ends of the first and second shafts and perpendicular to the same. The two walls have openings through which the first and second shafts pass or can be accessed. The linear guide system comprises guide elements fixed in both walls above and below said openings, preferably equidistant from the first and second shafts. The nut and screw system also comprises screws arranged above and below the openings, preferably equidistant from the first and second shafts.

[0014] Several modules or printing groups of the present invention can be grouped to form a printing machine provided with multiple printing groups, and the support structure of each module or printing group is configured to be incorporated into or form part of a structural support assembly of the printing machine. If there is a common central printing drum for multiple printing groups, the support structures of the modules will not include a printing roller or drum but the central printing drum will be supported in other elements of the structural assembly of the machine.

Brief Description of the Drawings

[0015] The foregoing and other features will be better understood from the following detailed description of exemplary embodiments with reference to the attached drawings, in which:

Figure 1 is a schematic side view of a printing group for variable format offset with fixed position central printing drum according to an embodiment of the present invention in a working position on a minimum format;

Figure 2 is a schematic side view of the printing group of Figure 1 in a resting position with minimum format;

Figure 3 is a schematic side view of the printing group of Figure 1 in a working position on a maximum format;

Figure 4 is a schematic side view of the printing group of Figure 1 in a resting position with maximum format;

Figure 5 is a schematic side view of the printing group of Figure 1 in a resting position and with the operator side supports of the first and second carriages decoupled and displaced to allow a format change;

Figure 6 is a schematic side view of the printing group of Figure 1 in a resting position with the operator side supports of the first and second carriages decoupled and displaced, wherein the rollers or sleeves for offset printing have been replaced by flexographic printing rollers or sleeves and wherein a flexographic inking unit has been additionally installed;

Figure 7 is a transverse cross-section view of a first carriage of the printing group of Figure 1;

Figure 8 is a transverse cross-section view of a second carriage of the printing group of Figure 1;

Figure 9 is a transverse cross-section view of a third carriage of the printing group of Figure 1 equipped with an offset printing head;

Figure 10 is a schematic side partial view of the printing group showing the offset printing head in a resting position;

Figure 11 is a schematic side partial view of the printing group showing the offset printing head in an approximating position on a maximum format;

Figure 12 is a schematic side partial view of the printing group showing the offset printing head in a working position on the maximum format;

Figure 13 is a schematic side partial view of the printing group showing the offset printing head in a working position on a minimum format;

Figure 14 is a schematic side view of a printing machine according to an embodiment of the present invention including two pairs of printing groups such as that of Figures 1-6 with a single common central printing drum;

Figure 15 is a schematic side view of a printing machine according to another embodiment of the present invention including three pairs of printing groups such as that of Figures 1-6 with a single common central printing drum;

Figure 16 is a schematic side view of a printing machine according to another embodiment of the present invention including four pairs of printing groups such as that of Figures 1-6 with a single common central printing drum;

Detailed Description of exemplary embodiments

[0016] First referring to Figures 1 to 6, a printing group 65 for variable format offset with fixed position central printing drum according to the present invention is shown therein. The present invention also contemplates a printing machine incorporating several printing groups 65 such as that of Figures 1 to 6 or a printing machine based on the technical principles thereof.

[0017] The printing group 65 is conceived as a module and comprises a support structure 32 on which there is fixed a linear guide system 2 positioned in relation with the position of a central printing drum 1b installed in a structural assembly 60 which the support structure 32 forms part thereof, as will be explained below in relation with Figures 14 to16. The printing group 65 includes a first carriage 3, a second carriage 6 and a third carriage 9 arranged such that they can be displaced along said linear guide system 2 by actuating means which will be described below. The first carriage 3 is provided with supports rotationally holding a first shaft 4 configured for receiving in an exchangeable manner a rubber-wrapped blanket sleeve 5a selected from a set of rubber-wrapped blanket sleeves of different sizes. The second carriage 6 is provided with supports to rotationally hold a second shaft 7 configured for receiving in an exchangeable manner a plate sleeve 8a selected from a set of plate sleeves of different sizes. Alternatively, the supports of the first and second carriages 3, 6 can be configured for supporting in a rotatable and exchangeable manner respective rubber-wrapped blanket roller 5a and plate roller 8a integrally provided with their corresponding shafts 4, 7.

[0018] The rubber-wrapped blanket sleeve 5a and plate sleeve 8a are specific for the offset printing system and the rubber-wrapped blanket sleeve 5a and the plate sleeve 8a must be of the same diameter for any particular format. Figures 1 and 2 show the smallest acceptable rubber-wrapped blanket sleeve 5a and plate sleeve 8a, whereas Figure 3 and 4 show the largest acceptable rubber-wrapped blanket sleeve 5a and plate sleeve 8a. The rotation axes of the central printing drum 1b, the rubber-wrapped blanket sleeve 5a and the plate sleeve 8a are parallel to one another. In a working position (Figures 1 and 3), the rubber-wrapped blanket sleeve 5a is in contact with the central printing drum 1b and the plate sleeve 8a is in contact with the rubber-wrapped blanket sleeve 5a. In a resting position (Figures 2 and 4) the rubber-wrapped blanket sleeve 5a is separated from the central printing drum 1b and the plate sleeve 8a is separated from the rubber-wrapped blanket sleeve 5a.

[0019] An offset inking head 10 provided with a plurality of ink-supplying rollers 11, 12, 13 parallel to the rotation axis of the plate sleeve 8a and which, in the working position (Figures 1 and 3), are in contact with the same is installed on the third carriage 9. The offset inking head 10 comprises devices for approximating said third carriage 9 to the plate roller or sleeve 8a installed in the second shaft 7, identifying and fixing the working position thereof in relation with the position of the plate sleeve 8a and fitting the positions of all the mentioned ink-supplying rollers 11, 12, 13 conforming to the perimeter of the plate sleeve 8a, regardless of the diameter of the latter.

[0020] As shown in Figures 7 and 8, the first carriage 3 has, at the side of the support structure 32 opposite the operator, a transmission side support 3b capable of supporting the first shaft 4 in cantilever and at the side of the support structure 32 wherein the operator is, an operator side support 3a which can be decoupled and displaced with respect to the transmission side support 3b to enable extracting the rubber-wrapped blanket sleeve 5a from the first shaft 4 and replacing it with another of the same or different size (Fig. 5). Similarly, the second carriage 6 has a transmission side support 6b at the side opposite the operator capable of supporting the second shaft 7 in cantilever and an operator side support 6a at the side of the operator which can be decoupled and displaced with respect to the transmission side support 6b to enable extracting the plate sleeve 8a from the second shaft 7 and replacing it with another of the same or different size (Fig. 5). In the operator side supports 3a, 6a of the first and second carriages 3, 6 respective actuation and transmission devices 53, 54 for rotating the first and second shafts 4, 7 are installed.

[0021] An additional feature of the printing group of the present invention is that the first shaft 4 is configured for

receiving a plate cylinder sleeve 5b substituting the rubber-wrapped blanket sleeve 5a and the second shaft 7 is configured for receiving a screen sleeve 8b substituting the plate sleeve 8a. Furthermore, said offset inking head 10 is provided with devices actuated to separate the third carriage 9 from the second carriage 6 a sufficient distance to allow installing a flexographic inking unit 14 operatively associated to the screen sleeve 8b installed in the second shaft 7 (Fig. 6). The plate cylinder rollers or sleeves 5b and screen rollers or sleeves 8b are specific for the flexographic printing system and for obtaining different formats it is only necessary to install plate cylinder sleeves 5b of different sizes, whereas the screen sleeves 8b can be of a constant diameter for any format, which simplifies the devices allowing the installation and extraction of the flexographic inking unit 14, which is fixed to the transmission side support 6b of the second carriage 6 and moves with the same. The flexographic inking unit 14 can be of a conventional type equipped with ink chamber and doctor blades or with one or more rubber-coated rollers. Furthermore, in the case of using a flexographic inking unit 14 with ink chamber and doctor blades, the latter could be located in the lower part of the screen roller 8b, such as described in patent ES-A-2216725.

[0022] In relation with Figures 1 to 8, guiding and actuating devices of the first and second carriages 3, 6 are described below. As shown in Figures 7 and 8, the support structure 32 comprises first and second facing walls 32a, 32b perpendicular to the first and second shafts 4, 7 and arranged in opposite ends of the same such that the rubber-wrapped blanket roller or sleeve 5a and plate roller or sleeve 8a are located between the two walls 32a, 32b. In the first and second walls 32a, 32b corresponding elongated openings 33a, 33b are formed through which the first and second shafts 4, 7 pass or can be accessed. The mentioned openings 33a, 33b or at least the opening 33a of the first wall 32a in the operator side are sized to allow the passage of rubber-wrapped blanket roller or sleeve 5a, plate cylinder roller or sleeve 5b, plate roller or sleeve 8a and screen roller or sleeve 8b of all sizes from a minimum format to a maximum format.

[0023] The linear guide system 2 comprises a first pair of upper and lower guide elements 26a, 26b fixed to said first wall 32a above and below the corresponding opening 33a and a second pair of upper and lower guide elements 27a, 27b fixed to said second wall 32b above and below the corresponding opening 33b. The mentioned guide elements 26a, 26b, 27a, 27b of the linear guide system 2 are arranged in horizontal directions. In the operator side supports 3a, 6a of the first and second carriages 3, 6 adjacent to the first wall 32a there are fixed at least one pair of upper and lower runners 28a, 28b, 30a, 30b coupled respectively to the first pair of upper and lower guide elements 26a, 26b, and in the transmission side supports 3b, 6b of the first and second carriages 3, 6 adjacent to the second wall 32b at the side opposite the operator there are fixed at least one pair of upper and lower runners 29a, 29b, 31a, 31b coupled respectively to the second pair of upper and lower guide elements 27a, 27b. Thus, the first and second carriages are displaced along the same guide elements 26a, 26b, 27a, 27b.

[0024] With this arrangement, the upper guide elements 26a, 27a of the first and second pairs of guide elements are above the first and second shafts 4, 7 and the lower guide elements 26b, 27b of the first and second pairs of guide elements are below the first and second shafts 4, 7. The upper and lower guide elements 26a, 26b, 27a, 27b are sufficiently separated to not interfere with the rubber-wrapped blanket roller or sleeve 5a, plate cylinder roller or sleeve 5b, plate roller or sleeve 8a and screen roller or sleeve 8b when these are installed in or extracted from the corresponding first and second shafts 4, 7 through the first opening 33a, regardless of its size. Although it is not essential, in the illustrated example the upper guide elements 26a, 27a and the lower guide elements 26b, 27b are equidistant from the first and second shafts 4, 7.

[0025] The displacements of the first and second carriages 3, 6 are actuated, in an embodiment, by means of a nut and screw system actuated by electric motors. For example, the operator side support 3a of the first carriage 3 has fixed thereon a pair of upper and lower nuts 36a, 36b (Fig. 7) coupled to a first pair of first upper and lower screws 34a, 34b assembled on the first wall 32a of the support structure 32 (see also Figures 1 to 6), and the transmission side support 3b of the first carriages 3 has fixed thereon a pair of upper and lower nuts 37a, 37b (Fig. 7) coupled to a second pair of first upper and lower screws 35a, 35b assembled on the second wall 32b of the support structure 32. All the first screws 34a, 34b, 35a, 35b extend along of a first portion of the linear guide system 2 closest to the central printing drum 1b, and are operatively connected to be actuated in unison by a first electric motor 38 (Figures 1 a 6) such that the rotation of the first screws 34a, 34b, 35a, 35b displaces the first carriage 3 along said first portion of the linear guide system 2. Similarly, the operator side support 6a of the second carriage 6 has fixed thereon a pair of upper and lower nuts 41a, 41b (Fig. 8) coupled to a first pair of second upper and lower screws 39a, 39b assembled on the first wall 32a of the support structure 32 (see also Figures 1 to 6), and the transmission side support 6b of the second carriage 6 has fixed thereon at least one pair of upper and lower nuts 42a, 42b (Fig. 8) coupled to a second pair of second upper and lower screws 40a, 40b (Fig. 8) assembled on the second wall 32b of the support structure 32. All the second screws 39a, 39b, 40a, 40b extend along a second portion of the linear guide system 2 furthest away from the central printing drum 1b, and are operatively connected to be actuated in unison by a second electric motor 43 (Figures 1 a 6) such that the rotation of the second screws 39a, 39b, 40a, 40b displaces the second carriage 6 along said second portion of the linear guide system 2. Although it is not essential, in the illustrated example the first screws 34a, 34b, 35a, 35b and the second screws 39a, 39b, 40a, 40b are

aligned to one another in each position and superimposed to the guide elements 26a 26b, 27a, 27b.

[0026] Alternatively linear motors could be used for displacing the first and second carriages 3, 6. Referring to the linear guide system, this could include guide elements arranged alternatively only in the lower part or only in the upper part of the support structure 32 with reference to the support shafts 4 and 7, with a reinforced T- or L-configuration of the carriages 3, 6 for supporting the corresponding runners coupled to the linear guide elements.

[0027] As shown in Figure 9, the third carriage 9 has an operator side support 9a at the side of the support structure 32 wherein the operator is and a transmission side support 9b at the opposite side. In the transmission side support 9b there are installed actuation and transmission devices 55 for rotating the rollers of the offset inking head 10. In the operator side support 9a there are fixed at least one pair of upper and lower runners 44a, 44b coupled respectively to the first pair of upper and lower guide elements 26a, 26b installed in the first wall 32a of the support structure 32, and in the transmission side support 9b there are fixed at least another pair of upper and lower runners 45a, 45b coupled respectively to the second pair of upper and lower guide elements 27a, 27b installed in the second wall 32b of the support structure 32, such that the third carriage 9 is displaced along the same guide elements 26a, 26b, 27a, 27b as the first and second carriages 3, 6. The ink-supplying rollers 11, 12, 13 and other components of the offset inking head 10 are installed between a pair of first and second plates 10a, 10b located in the lower part of the first and second walls 32a, 32b of the support structure 32 and connected, respectively, with the operator side support 9a and the transmission side support 9b of the third carriage 9, respectively, through the openings 33a, 33b of the support structure 32. Between each of the first and second plates 10a, 10b of the offset inking head 10 and the respective first and second wall 32a, 32b of the support structure 32 there is arranged a corresponding linear actuator 46 (see also Figures 10 to 13) connected to the same by their ends. The extension and retraction of the linear actuators 46 displace the third carriage 9 with the offset inking head along the guiding system 2.

[0028] Alternative arrangements for the linear guide system 2 and for the actuation devices for displacing the first, second and third carriages 3, 6, 9 would be obvious to a person skilled in the art without departing from the scope of the present invention.

[0029] Now in relation with Figures 10 to 13 the basic characteristics of the offset inking head 10 of the present invention are described. The ink-supplying rollers 11, 12, 13 of the offset inking head 10, which are configured to come into contact with the plate sleeve 8a comprise an upper ink-supplying roller 11, a central ink-supplying roller 12 and a lower ink-supplying roller 13. The central ink-supplying roller 12 is assembled in a central pivoting support 17 and a central linear actuator 18 is arranged to push said central pivoting support 17 until pressing said central ink-supplying roller 12 against the plate sleeve 8a. The upper ink-supplying roller 11 is assembled in an upper pivoting support 15 and an upper linear actuator 16 is arranged to push said upper pivoting support 15 until pressing said upper ink-supplying roller 11 against the plate sleeve 8a. The lower ink-supplying roller 13 is assembled in a lower pivoting support 19 and a lower linear actuator 20 is arranged to push said lower pivoting support 19 until pressing said lower ink-supplying roller 13 against the plate sleeve 8a. The upper ink-supplying roller 11 is in contact with an upper ink-transferring roller 21 which is coaxial with a pivoting shaft of the upper pivoting support 15 and in turn is in contact with an upper fixed roller 22 of a train of ink-transferring rollers 25. The central ink-supplying roller 12 and the lower ink-supplying roller 13 are in contact with a lower ink-transferring roller 23 which is coaxial with a common pivoting shaft of the central pivoting support 17 and of the lower pivoting support 19, which in turn is in contact with a lower fixed roller 24 of said train of ink-transferring rollers 25. One or more rollers of the train of ink-transferring rollers 25 are intermittently in contact with an ink-applying group 47.

[0030] A water-applying group 48 comprising a pair of water-transferring rollers 51a, 51b associated to a water application tank is assembled on another pivoting support 49. The pivoting support 49 of the water-applying group 48 is displaced by the movement of the lower pivoting support 19, to which it is mechanically linked. The contact between the two water-transferring rollers 51a, 51b can be controlled by means of actuating a linear actuator 50 to control or eliminate the flow of water to be delivered. A mechanical element linking the pivoting supports 19 and 49 can be selectively moved by a linear actuator (not shown) to contact the upper water-transferring roller 51a with the lower ink-supplying roller 13 for the purpose of performing a wet offset printing, or not to contact, for performing a dry or waterless offset printing.

[0031] It must be taken into account that for a wet offset printing, first the water must be applied and then the ink must be applied on the surface of the plate roller 8a. Figures 1 to 6 and 10 to 13 show a right-hand printing group 65 adapted for an anti clockwise rotation direction of the plate roller 8a (indicated by means of an arrow in the drawings), which coincides with the rotation direction of the central printing drum 1b and with the displacement direction of the substrate in the form of continuous band. Due to this reason, in the illustrated example the water-applying group 48 is associated to the lower ink-supplying roller 13. It will be understood that a left hand printing group adapted for a plate roller 8a rotating in the same anti clockwise direction indicated by the arrows would have the water-applying group 48 associated to the upper ink-supplying roller 11. Similarly, it will also be understood that if the plate roller 8a rotates in the opposite direction, i.e., a clockwise rotation direction, in a right hand printing group the water-applying group 48 would be associated to the upper ink-supplying roller 11 and in a left hand printing group the water-applying group 48

would be associated to the lower ink-supplying roller 13.

[0032] In the illustrated embodiment, all the linear actuators are pneumatic cylinders, although for the purposes of the present invention they could be of other nature such as linear electric actuators, hydraulic cylinder actuators, etc.

[0033] The operation of the offset inking head 10 is the following. Assuming that the third carriage 9 is initially in the resting position shown in Figure 10 (equivalent to the position of the third carriage 9 shown in Figures 2 and 4), and that on the first and second shafts 4, 7 corresponding rubber-wrapped blanket roller or sleeve 5a and plate roller or sleeve 8a, which have been depicted in a maximum format in Figures 11 and 12, are installed. Firstly, the first and second carriages 3, 6 are displaced to their corresponding working positions in which the rubber-wrapped blanket sleeve 5a is in contact with the central printing drum 1b and the plate sleeve 8a is in contact with the rubber-wrapped blanket sleeve 5a. Then the upper and lower linear actuators 16, 20 are activated to locate the corresponding upper and lower ink-supplying rollers 11, 13 in respective retracted positions whereas the central linear actuator 18 is activated to locate the central ink-supplying roller 12 in an extended position. Then, the linear displacement actuators 46 are activated to retract and thereby move the third carriage 9 with the offset inking head 10 towards the second carriage 6 until the central ink-supplying roller 12, which is in its extended position, contacts with the plate sleeve 8a. In this position, a locking device is actuated to lock the linear displacement actuators 46 and thereby immobilize the third carriage 9 in a reference working position, whereas the offset inking head 10 is in an approximation position in which the central ink-supplying roller 12 is in contact with the plate sleeve 8a and the upper and lower ink-supplying rollers 11, 13 are separated from the same (Figure 11).

[0034] Then, while the third carriage 9 is maintained in the reference working position, the upper and lower linear actuators 16, 20 are activated towards their extended positions for pivoting the respective upper and lower pivoting supports 15, 19 until the upper and lower ink-supplying rollers 11, 13 contact with the plate sleeve 8a, regardless of the diameter of the same. Thereby, the offset inking head 10 reaches a working position (Fig. 12) in which the three ink-supplying rollers 11, 12, 13 are in contact with the plate sleeve 8a. Figure 12 shows the offset inking head 10 in the working position on the maximum acceptable format (rubber-wrapped blanket roller or sleeve 5a and plate roller or sleeve 8a of maximum diameter) and Figure 13 shows the same offset inking head 10 in the working position on the minimum acceptable format (rubber-wrapped blanket roller or sleeve 5a and plate roller or sleeve 8a of minimum diameter). It is observed that the reference working positions of the third carriage 9 and the working positions of the offset inking head are different in Figures 12 and 13, because such positions depend on the format and are automatically reached in virtue of the special construction of the printing group of the present invention. The offset inking head 10 has devices configured to lock the upper and lower linear actuators 16, 20 for actuating the movements of the upper and lower pivoting supports 15, 19 in the working position adapted to the format with which it is working, and this in combination with the maintenance of the central linear actuator 18 in the extended position keeps the upper, central and lower ink-supplying rollers 11, 12, 13 in the working position.

[0035] From the reference working position of the third carriage 9 it is possible to automatically generate an out-of-contact position (not shown) of the offset inking head 10 in which, without a displacement of the third carriage 9, the upper, central and lower ink-supplying rollers 11, 12, 13 are out-of-contact with the plate sleeve 8a by a small pivoting of the upper, central and lower pivoting supports 15, 17, 19 towards a retracted position. In an embodiment, the upper and lower linear actuators 16, 20 are double stroke pneumatic cylinders and the out-of-contact position is achieved by activating the central linear actuator 18 and the sections corresponding to a second stroke of the upper and lower linear actuators 16, 20 towards a retracted position.

[0036] Figures 14 to 16 show exemplary embodiments of a printing machine of the present invention including printing groups 65 such as that described above in relation with Figures 1 to 13, wherein the printing groups 65 are in the form of modules combined according to several possible configurations. The horizontal arrangement of the guide elements 26a, 26b, 27a, 27b in the printing groups 65 facilitates piling together the same when they are in the form of modules provided with an individual support structure 32.

[0037] Figure 14 shows a printing machine 70 provided with a central printing drum 1b dynamically supporting the substrate in the form of continuous band 62 on which the printing is performed, and four printing groups 65, two of them arranged at one side of the central printing drum 1b and the other two at the opposite side. In this case, although it is not essential, the four printing groups 65 are arranged in symmetrical positions both with respect to a horizontal plane and to a vertical plane passing through the axis of the central printing drum 1b. The particular support structures 32 of the four printing groups 65 are connected with one another and/or with other structural elements to form a structural assembly 60 for the printing machine 70, and the central printing drum 1b is installed on the structural assembly 60 in a fixed position.

[0038] Figure 15 shows a printing machine 70 provided with a central printing drum 1b dynamically supporting the substrate in the form of continuous band 62 on which the printing is performed, and six printing groups 65, three of them arranged at one side of the central printing drum 1b and the other three at the opposite side. In this case the three printing groups 65 piled together at each side of the central printing drum I b not all are vertically aligned. The particular support structures 32 of the six printing

groups 65 are connected with one another and/or with other structural elements to form a structural assembly 60 for the printing machine 70, and the central printing drum 1b is installed on the structural assembly 60 in a fixed position.

[0039] Figure 16 shows a printing machine 70 provided with a central printing drum 1b dynamically supporting the substrate in the form of continuous band 62 on which the printing is performed, and eight printing groups 65, four of them arranged at one side of the central printing drum 1b and the other four at the opposite side. In this case the four printing groups 65 piled together at each side of the central printing drum 1b are not all vertically aligned. The particular support structures 32 of the eight printing groups 65 are connected with one another and/or with other structural elements to form a structural assembly 60 for the printing machine 70, and the central printing drum 1b is installed on the structural assembly 60 in a fixed position.

[0040] It is understood that, in view of the different configurations of printing machine 70 with central printing drum 1b shown in Figures 14 to 16, alternative configurations will be obvious for a person skilled in the art without departing from the scope of the present invention. For example, a printing machine 70 provided with a central printing drum 1b and more than eight printing groups 65, or with a number of printing groups at the right hand different from the number of printing groups at the left hand of the central printing drum 1b, etc.

[0041] What is significantly important about the printing machine 70 formed from printing groups 65 in the form of modules is that it allows successively printing by means of a plurality of printing groups in offset system with readily variable format on a substrate in the form of relatively elastic continuous band, such as plastic without considerable losses or misregister because the substrate in the form of continuous band can be dynamically supported on a single central printing drum having a fixed position throughout the printing process. This eliminates the defects produced by vibration of the substrate and tension variations of the substrate which are typically produced in the regions between printing rollers of adjacent printing groups in the offset printing machines of the prior art when a relatively elastic thin substrate in the form of non-supported continuous band is printed.

[0042] Furthermore, the particular construction of the printing groups 65 of the present invention allows converting the offset printing group easily and quickly into a flexographic printing group, such that a printing machine of the present invention provided with multiple printing groups is capable of printing everything in offset, everything in flexographic, or parts in offset and parts in flexographic. Likewise, the particular construction of the printing groups 65 of the present invention allows performing a format change easily and quickly both in offset and in flexography.

[0043] A person skilled in the art will be able to introduce modifications and variations to the embodiments shown and described without departing from the scope of the present invention as defined in the attached claims.

Claims

1. A printing machine for variable format offset comprising one central printing drum (1b) rotatably supported in a fixed position on a structural assembly (60), and a plurality of printing groups (65), each printing group (65) comprising:

   an individual support structure (32) to which a linear guide system (2) is fixed, said support structure (32) being fixed to said structural assembly (60) in relation with said central printing drum (1b);
   a first carriage (3) arranged to be displaced by first actuating means along said linear guide system (2) and provided with support devices configured for supporting in a rotatable and exchangeable manner an offset rubber-wrapped blanket roller or sleeve (5a) selected from a set of offset rubber-wrapped blanket rollers or sleeves of different sizes;
   a second carriage (6) arranged to be displaced by second actuating means along said linear guide system (2) and provided with support devices configured for supporting in a rotatable and exchangeable manner an offset plate roller or sleeve (8a) selected from a set of offset plate rollers or sleeves of different sizes; and
   a third carriage (9) arranged to be displaced by third actuating means along said linear guide system (2) and on which is installed an offset inking head (10) provided with devices for approximating said third carriage (9) to said offset plate roller or sleeve (8a) installed in said second carriage (6), and identifying and fixing a reference working position of the third carriage (9) in relation with the offset plate roller or sleeve (8a), **characterized in that**:

   the linear guide system (2) of each printing group (65) is arranged to guide the movements of the first, second and third carriages (3, 6, 9) in a horizontal direction; and
   the support structures (32) of the printing groups (65) which are located at either side of the central printing drum (1b) are piled together and connected to one another and/or to other structural elements to form said structural assembly (60).

2. The printing machine according to claim 1, **characterized in that** said offset inking head (10) comprises a plurality of ink-supplying rollers (11, 12, 13) including a central ink-supplying roller (12) assembled in

a central movable support (17) and a central linear actuator (18) arranged to move said central movable support (17) and said central ink-supplying roller (12) between an extended position, in which the central ink-supplying roller (12) determines said reference working position for the third carriage (9) when, with the rest of the ink-supplying rollers (11, 13) being in a retracted position, the central ink-supplying roller (12) contacts with the offset plate roller or sleeve (8a) in a working position, and a retracted position, in which the central ink-supplying roller (12) together with the rest of the ink-supplying rollers (11, 13) are out-of-contact with the offset plate roller or sleeve (8a) whereas the third carriage (9) is maintained in said reference working position, and means for fitting said other ink-supplying rollers (11, 13) to the perimeter of the offset plate roller or sleeve (8a).

3. The printing machine according to claim 1 or 2, **characterized in that**:

said supporting means of the first carriage (3) are configured for supporting in a rotatable and exchangeable manner a flexographic plate cylinder roller or sleeve (5b) selected from a set of flexographic plate cylinder rollers or sleeves of different sizes substituting said offset rubber-wrapped blanket roller or sleeve (5a);
said supporting means of the second carriage (6) are configured for supporting in a rotatable and exchangeable manner a flexographic screen roller or sleeve (8b) substituting said offset plate roller or sleeve (8a); and
said offset inking head (10) is provided with devices to separate the third carriage (9) from the second carriage (6) a sufficient distance to allow installing a flexographic inking unit (14) operatively associated to a flexographic screen roller or sleeve (8b) installed in the second carriage (6).

4. The printing machine according to claim 2, **characterized in that** the central ink-supplying roller (12) has a rotation axis located, in said working position, in the same geometric plane as a first shaft (4) about which the offset rubber-wrapped blanket roller or sleeve (5a) rotates and a second shaft (7) about which the offset plate roller or sleeve (8a) rotates.

5. The printing machine according to claim 3, **characterized in that** said offset inking head (10) comprises a central ink-supplying roller (12) having a rotation axis located, in a working position, in the same geometric plane as a first shaft (4) about which the flexographic plate roller or sleeve (5b) rotates and a second shaft (7) about which the flexographic screen roller or sleeve (8b) rotates.

6. The printing machine according to claim 3, **characterized in that** said flexographic inking unit (14) is fixed to said second carriage (6) and moves with the same.

7. The printing machine according to claim 3, **characterized in that** said support structure (32) comprises first and second facing walls (32a, 32b), and the linear guide system (2) comprises a first pair of upper and lower guide elements (26a, 26b) fixed to said first wall (32a) and to which there are coupled at least one corresponding pair of upper and lower runners (28a, 28b; 30a, 30b, 44a, 44b) fixed in a first end of each of the first, second and third carriages (3, 6, 9), and a second pair of upper and lower guide elements (27a, 27b) fixed to said second wall (32b) and to which there are coupled at least one corresponding pair of upper and lower runners (29a, 29b; 31a, 31b, 45a, 45b) fixed in a second end of each of the first, second and third carriages (3, 6, 9).

8. The printing machine according to claim 7, **characterized in that** the upper guide elements (26a, 27a) of the first and second pairs of guide elements are above the offset rubber-wrapped blanket roller or offset sleeve and plate roller or sleeve (5a, 8a), respectively, and the lower guide elements (26b, 27b) of the first and second pairs of guide elements are below the offset rubber-wrapped blanket roller or offset sleeve and plate roller or sleeve (5a, 8a), and arc sufficiently separated to allow the passage therebetween and through an opening (33a, 33b) formed in at least one of the first and second walls (32a, 32b) of offset rubber-wrapped blanket roller or sleeve (5a), flexographic plate roller or sleeve (5b), offset plate roller or sleeve (8a) and flexographic screen roller or sleeve (8b) of all sizes from a minimum format to a maximum format.

9. The printing machine according to any one of the preceding claims, **characterized in that** it comprises a number of said printing groups (65) located in opposite sides of the central printing drum (1b), which is arranged for supporting a substrate in the form of continuous band on which the printing is performed.

10. A printing group for variable format offset comprising;

a support structure (32) to which a linear guide system (2) is fixed, said support structure (32) being configured to be operatively connected to a structural assembly (60) on which one central printing drum (1b) is rotatably installed in a fixed position;
a first carriage (3) arranged to be displaced by first actuating means along said linear guide system (2) and provided with support devices con-

figured for supporting in a rotatable and exchangeable manner an offset rubber-wrapped blanket roller or sleeve (5a) selected from a set of offset rubber-wrapped blanket rollers or sleeves of different sizes;
a second carriage (6) arranged to be displaced by second actuating means along said linear guide system (2) and provided with support devices configured for supporting in a rotatable and exchangeable manner an offset plate roller or sleeve (8a) selected from a set of offset plate rollers or sleeves of different sizes; and
a third carriage (9) arranged to be displaced by third actuating means along said linear guide system (2) and on which is installed an offset inking head (10) provided with devices for approximating said third carriage (9) to said offset plate roller or sleeve (8a) installed in said second carriage (6), and identifying and fixing a reference working position of the third carriage (9) in relation with the offset plate roller or sleeve (8a), **characterized in that**:

said support structure (32) of said printing group (65) is configured to be piled together and connected with other support structures (32) of analogous printing groups (65) at either side of the central printing drum (1b) and connected to other structural elements to form said structural assembly (60); and
the linear guide system (2) of the printing group (65) is arranged to guide the movements of the first, second and third carriages (3, 6, 9) in a horizontal direction when the support structure (32) of the printing group (65) is operatively connected to the structural assembly (60).

11. The printing group according to claim 10, **characterized in that** said offset inking head (10) comprises a plurality of ink-supplying rollers (11, 12, 13) including a central ink-supplying roller (12) assembled in a central movable support (17) and a central linear actuator (18) arranged to move said central movable support (17) and said central ink-supplying roller (12) between an extended position, in which the central ink-supplying roller (12) determines said reference working position for the third carriage (9) when, with the upper and lower ink-supplying rollers (11, 13) in the retracted position, the central ink-supplying roller (12) contacts with the offset plate roller or sleeve (8a) in a working position, and a retracted position, in which the central ink-supplying roller (12) together with the rest of the ink-supplying rollers (11, 13) are out-of-contact with the offset plate roller or sleeve (8a) whereas the third carriage (9) is maintained in said reference working position, and means for fitting said other ink-supplying rollers (11, 13) to the perimeter of the offset plate roller or sleeve (8a).

12. The printing group according to claim 11, **characterized in that**;
said supporting means of the first carriage (3) are configured for supporting in a rotatable and exchangeable manner a flexographic plate cylinder roller or sleeve (5b) selected from a set of plate flexographic cylinder rollers or sleeves of different sizes substituting said rubber-wrapped blanket roller or sleeve (5a);
said supporting means of the second carriage (6) are configured for supporting in a rotatable and exchangeable manner a flexographic screen roller or sleeve (8b) substituting said offset plate roller or sleeve (8a); and
said offset inking head (10) is provided with devices to separate the third carriage (9) from the second carriage (6) a sufficient distance to allow installing a flexographic inking unit (14) operatively associated to a flexographic screen roller or sleeve (8b) installed in the second carriage (6).

13. The printing group according to claim 12, **characterized in that** the central ink-supplying roller (12) has a rotation axis located in said working position, in the same geometric plane as a first shaft (4) about which the offset rubber-wrapped blanket roller or sleeve (5a) rotates and a second shaft (7) about which the offset plate roller or sleeve (8a) rotates.

Patentansprüche

1. Druckmaschine für formatvariablen Offset, umfassend eine mittlere Drucktrommel (1 b), welche in einer festen Stellung auf einem Struktursatz (60) drehbar gehalten wird, und eine Mehrzahl von Druckgruppen (65), wobei jede Druckgruppe (65) Folgendes umfasst:

eine einzelne Haltestruktur (32), an der ein System aus linearen Führungen (2) befestigt ist, wobei die genannte Haltestruktur (32) an dem genannten Struktursatz (60) in Bezug auf die genannte mittlere Drucktrommel (1 b) befestigt ist;
einen ersten Schlitten (3), welcher dazu angeordnet ist, sich durch erste Antriebsmittel durch das genannte System aus linearen Führungen (2) zu bewegen und welcher mit Haltevorrichtungen versehen ist, welche ausgebildet sind, um eine Offset-Gummituchwalze oder -hülse (5a), ausgewählt aus einem Satz von Offset-Gummituchwalzen oder -hülsen verschiedener Größe, drehbar und austauschbar zu halten;
einen zweiten Schlitten (6), welcher dazu angeordnet ist, sich durch zweite Antriebsmittel durch

das genannte System aus linearen Führungen (2) zu bewegen und welcher mit Haltevorrichtungen versehen ist, welche ausgebildet sind, um eine Offset-Plattenwalze oder -hülse (8a), ausgewählt aus einem Satz von Offset-Plattenwalzen oder -hülsen verschiedener Größe, drehbar und austauschbar zu halten; und
einen dritten Schlitten (9), welcher dazu angeordnet ist, sich durch dritte Antriebsmittel durch das genannte System aus linearen Führungen (2) zu bewegen und auf welchem einen Offset-Farbauftragkopf (10) eingebaut ist,
welcher mit Vorrichtungen versehen ist, um den genannten dritten Schlitten (9) an die genannte, in dem genannten zweiten Schlitten (6) eingebaute Offset-Plattenwalze oder -hülse (8a) anzunähern, und eine Arbeitsbezugsstellung des dritten Schlittens (9) in Bezug auf die Offset-Plattenwalze oder -hülse (8a) zu erkennen und festzulegen,
dadurch gekennzeichnet, dass:

das System aus linearen Führungen (2) jeder Druckgruppe (65) dazu angeordnet ist, die Bewegungen des ersten, zweiten und dritten Schlittens (3, 6, 9) in eine horizontale Richtung zu führen; und
die Haltestrukturen (32) der Druckgruppen (65), welche sich zu beiden Seiten der mittleren Drucktrommel (1b) befinden, aufeinander gestapelt sind und
untereinander und/oder mit anderen Strukturelementen verbunden sind, um den genannten Struktursatz (60) zu bilden.

2. Druckmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** der genannte Offset-Farbauftragkopf (10) eine Mehrzahl von Farbwalzen (11, 12, 13) umfasst, einschließlich einer mittleren Farbwalze (12), die an einer beweglichen mittleren Halterung (17) montiert ist, und eines linearen mittleren Betätigungselement (18), welcher dazu angeordnet ist, die genannte bewegliche mittlere Halterung (17) und die genannte mittlere Farbwalze (12) zwischen einer gestreckten Stellung, in der die mittlere Farbwalze (12) die genannte Arbeitsbezugsstellung für den dritten Schlitten (9) bestimmt, wenn, während der Rest der Farbwalzen (11, 13) sich in einer zurückgesetzten Stellung befinden, die mittlere Farbwalze (12) mit der Offset-Plattenwalze oder -hülse (8a) in einer Arbeitsstellung in Kontakt kommt, und einer zurückgesetzten Stellung, in der die mittlere Farbwalze (12) zusammen mit dem Rest der Farbwalzen (11, 13) nicht mit der Offset-Plattenwalze oder -hülse (8a) in Kontakt stehen, während der dritte Schlitten (9) in der genannten Arbeitsbezugsstellung gehalten wird, zu bewegen, und Mittel, um die genannten restlichen Farbwalzen (11, 13) an den Umfang der Offset-Plattenwalze oder -hülse (8a) anzupassen.

3. Druckmaschine nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass**:

die genannten Haltemittel des ersten Schlittens (3) dazu ausgebildet sind, eine flexographische Plattenzylinderwalze oder -hülse (5b), ausgewählt aus einem Satz von flexographischen Plattenzylinderwalzen oder -hülsen verschiedener Größe als Ersatz für die genannte Offset-Gummituchwalze oder -hülse (5a), drehbar und austauschbar zu halten;
die genannten Haltemittel des zweiten Schlittens (6) dazu ausgebildet sind, eine flexographische Rasterwalze oder -hülse (8b) als Ersatz für die genannte Offset-Plattenwalze oder -hülse (8a), drehbar und austauschbar zu halten; und
der genannte Offset-Farbauftragkopf (10) mit Vorrichtungen versehen ist, um den dritten Schlitten (9) von dem zweiten Schlitten (6) um einen ausreichenden Abstand zu entfernen, um den Einbau eines Flexodruckfarbwerks (14), das operativ einer am zweiten Schlitten (6) eingebauten flexographischen Rasterwalze oder -hülse (8b) zugeordnet ist, zu ermöglichen.

4. Druckmaschine nach Anspruch 2, **dadurch gekennzeichnet, dass** die mittlere Farbwalze (12) eine Drehachse aufweist, welche sich in der genannten Arbeitsstellung auf derselben geometrischen Ebene wie eine erste Welle (4) befindet, um die sich die Offset-Gummituchwalze oder -hülse (5a) dreht und eine zweite Welle (7), um die sich die Offset-Plattenwalze oder -hülse (8a) dreht.

5. Druckmaschine nach Anspruch 3, **dadurch gekennzeichnet, dass** der genannte Offset-Farbauftragkopf (10) eine mittlere Farbwalze (12) umfasst, die eine Drehachse aufweist, welche sich, in einer Arbeitsstellung auf derselben geometrischen Ebene wie eine erste Welle (4) befindet, um die sich die flexographische Plattenwalze oder -hülse (5b) dreht, und eine zweite Welle (7), um die sich die flexographische Rasterwalze oder -hülse (8b) dreht.

6. Druckmaschine nach Anspruch 3, **dadurch gekennzeichnet, dass** das genannte Flexodruckfarbwerk (14) an dem genannten zweiten Schlitten (6) befestigt ist und sich mit ihm bewegt.

7. Druckmaschine nach Anspruch 3, **dadurch gekennzeichnet, dass** die genannte Haltestruktur (32) eine erste und eine zweite Wand (32a, 32b) umfasst, welche gegenübergestellt sind, und das System aus linearen Führungen (2) ein erstes Paar aus einem oberen und einem unteren Führungselement (26a, 26b) umfasst, das an der genannten ersten Wand

(32a) befestigt ist und an der mindestens ein entsprechendes Paar aus einer oberen und einer unteren Gleitbahn (28a, 28b; 30a, 30b, 44a, 44b) angekoppelt ist, welche an einem ersten Ende von jedem des ersten, zweiten und dritten Schlittens (3, 6, 9) befestigt sind, und ein zweites Paar aus einem oberen und einem unteren Führungselement (27a, 27b), das an der genannten zweiten Wand (32b) befestigt ist und an der mindestens ein entsprechendes Paar aus einer unteren und einer oberen Gleitbahn (29a, 29b; 31a, 31b, 45a, 45b) angekoppelt ist, welche an einem zweiten Ende von jedem des ersten, zweiten und dritten Schlittens (3, 6, 9) befestigt sind.

8. Druckmaschine nach Anspruch 7, **dadurch gekennzeichnet, dass** die oberen Führungselemente (26a, 27a) des ersten und zweiten Paars aus Führungselementen sich jeweils über der Offset-Gummituchwalze oder -hülse und Offset-Plattenwalze oder -hülse (5a, 8a), und die unteren Führungselemente (26b, 27b) des ersten und des zweiten Paars aus Führungselementen sich unter der Offset-Gummituchwalze oder -hülse und Offset-Plattenwalze oder -hülse (5a, 8a) befinden, und ausreichend getrennt sind, um den Durchgang zwischen Beiden und durch eine Öffnung (33a, 33b) zu ermöglichen, die mindestens an einer der ersten und zweiten Wand (32a, 32b) der Offset-Gummituchwalze oder - hülse (5a), der flexographischen Plattenwalze oder -hülse (5b), der Offset-Plattenwalze oder -hülse (8a) und der flexographischen Rasterwalze oder -hülse (8b) aller Größen von einem Mindestformat zu einem maximalen Format, gebildet ist.

9. Druckmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie eine Anzahl von den genannten Druckgruppen (65) umfasst, welche sich auf gegenüberliegenden Seiten der mittleren Drucktrommel (1 b) befinden, die dazu angeordnet ist, ein Substrat in Form einer fortlaufenden Bahn, auf das der Druck durchgeführt wird, zu halten.

10. Druckgruppe für formatvariablen Offset umfassend:

eine Haltestruktur (32), an der ein System aus linearen Führungen (2) befestigt ist, wobei die genannte Haltestruktur (32) dazu ausgebildet ist, operativ an einen Struktursatz (60) verbunden zu werden, auf welchem eine mittlere Drucktrommel (1 b) in einer festen Stellung drehbar eingebaut ist;
einen ersten Schlitten (3), welcher dazu angeordnet ist, um sich durch erste Antriebsmittel durch das genannte System aus linearen Führungen (2) zu bewegen und welcher mit Haltevorrichtungen versehen ist, die ausgebildet sind, um eine Offset-Gummituchwalze oder -hülse (5a), ausgewählt aus einem Satz von Offset-Gummituchwalzen oder -hülsen verschiedener Größe, drehbar und austauschbar zu halten;
einen zweiten Schlitten (6), welcher dazu angeordnet ist, um sich durch zweite Antriebsmittel durch das genannte System aus linearen Führungen (2) zu bewegen und welcher mit Haltevorrichtungen versehen ist, die ausgebildet sind, um eine Offset-Plattenwalze oder -hülse (8a), ausgewählt aus einem Satz von Offset-Plattenwalzen oder -hülsen verschiedener Größe, drehbar und austauschbar zu halten; und
einen dritten Schlitten (9), welcher dazu angeordnet ist, um sich durch dritte Antriebsmittel durch das genannte System aus linearen Führungen (2) zu bewegen und auf dem ein Offset-Farbauftragkopf (10) eingebaut ist, welcher mit Vorrichtungen versehen ist, um den genannten dritten Schlitten (9) an die genannte, in dem genannten zweiten Schlitten (6) eingebauten Plattenwalze oder -hülse (8a) anzunähern, und eine Arbeitsbezugsstellung des dritten Schlittens (9) in Bezug auf die Offset-Plattenwalze oder -hülse (8a) zu erkennen und festzulegen,
dadurch gekennzeichnet, dass:

die genannte Haltestruktur (32) der genannten Druckgruppe (65) dazu ausgebildet ist, mit anderen Haltestrukturen (32) zusammen gestapelt zu werden und mit anderen Haltestrukturen (32) von analogen Druckgruppen (65) zu beiden Seiten der mittleren Drucktrommel (1 b) und mit anderen Strukturelementen verbunden zu werden, um den genannten Struktursatz (60) zu bilden; und
das System aus linearen Führungen (2) der Druckgruppe (65) dazu angeordnet ist, die Bewegungen des ersten, zweiten und dritten Schlittens (3, 6, 9) in eine horizontale Richtung zu führen, wenn die Haltestruktur (32) der Druckgruppe (65) operativ mit dem Struktursatz (60) verbunden ist.

11. Druckgruppe nach Anspruch 10, **dadurch gekennzeichnet, dass** der genannte Offset-Farbauftragkopf (10) eine Mehrzahl von Farbwalzen (11, 12, 13) umfasst, einschließlich einer mittleren Farbwalze (12), die an einer beweglichen mittleren Halterung (17) montiert ist, und eines linearen mittleren Betätigungselement (18), welcher dazu angeordnet ist, die genannte bewegliche mittlere Halterung (17) und die genannte mittlere Farbwalze (12) zwischen einer gestreckten Stellung, in der die mittlere Farbwalze (12) die genannte Arbeitsbezugsstellung für den dritten Schlitten (9) bestimmt, wenn, während die obere und die untere Farbwalze (11, 13) sich in der zurück-

gesetzten Stellung befinden, die mittlere Farbwalze (12) mit der Offset-Plattenwalze oder -hülse (8a) in einer Arbeitsstellung in Kontakt kommt, und einer zurückgesetzten Stellung, in der die mittlere Farbwalze (12) zusammen mit dem Rest der Farbwalzen (11, 13) nicht mit der Offset-Plattenwalze oder -hülse (8a) in Kontakt stehen, während der dritte Schlitten (9) in der genannten Arbeitsbezugsstellung gehalten wird, zu bewegen, und Mittel, um die genannten restlichen Farbwalzen (11, 13) an den Umfang der Offset-Plattenwalze oder -hülse (8a) anzupassen.

12. Druckgruppe nach Anspruch 11, **dadurch gekennzeichnet, dass**:

die genannten Haltemittel des ersten Schlittens (3) dazu ausgebildet sind, eine flexographische Plattenzylinderwalze oder -hülse (5b), ausgewählt aus einem Satz von flexographischen Plattenzylinderwalzen oder -hülsen verschiedener Größe als Ersatz für die genannte Gummituchwalze oder -hülse (5a), drehbar und austauschbar zu halten;
die genannten Haltemittel des zweiten Schlittens (6) dazu ausgebildet sind, eine flexographische Rasterwalze oder -hülse (8b) als Ersatz für die genannte Offset-Plattenwalze oder -hülse (8a), drehbar und austauschbar zu halten; und
der genannte Offset-Farbauftragkopf (10) mit Vorrichtungen versehen ist, um den dritten Schlitten (9) von dem zweiten Schlitten (6) um einen ausreichenden Abstand zu entfernen, um den Einbau eines Flexodruckfarbwerk (14), das operativ einer am zweiten Schlitten (6) eingebauten flexographischen Rasterwalze oder -hülse (8b) zugeordnet ist, zu ermöglichen.

13. Druckgruppe nach Anspruch 12, **dadurch gekennzeichnet, dass** die mittlere Farbwalze (12) eine Drehachse aufweist, welche sich in der genannten Arbeitsstellung auf derselben geometrischen Ebene wie eine erste Welle (4) befindet, um die sich die Offset-Gummituchwalze oder -hülse (5a) dreht und eine zweite Welle (7), um die sich die Offset-Plattenwalze oder -hülse (8a) dreht.

Revendications

1. Une machine à imprimer pour offset à format variable comportant un cylindre d'impression central (1 b) supporté en rotation dans une position fixe sur un ensemble structurel (60) et une pluralité de groupes d'impression (65), chaque groupe d'impression (65) comportant:

une structure de support individuelle (32) à laquelle est fixé un système de guidage linéaire (2), cette structure de support (32) étant fixée à un ensemble structurel (60) relié à ce tambour d'impression central (1b);
un premier chariot (3) agencé pour être déplacé par des premiers moyens d'actionnement le long de ce système de guidage linéaire (2) et pourvu de dispositifs de support configurés pour supporter de façon rotatoire et échangeable un cylindre porte-blanchet gainé de caoutchouc ou chemise (5a) sélectionné d'un ensemble de cylindres porte-blanchet gainés de caoutchouc ou chemises ayant de diverses tailles;
un deuxième chariot (6) agencé pour être déplacé par des deuxièmes moyens d'actionnement le long de ce système de guidage linéaire (2) et pourvu de dispositifs de support configurés pour supporter de façon rotatoire et échangeable un cylindre porte-plaque d'offset ou chemise (8a) sélectionné d'un ensemble de cylindres porte-plaque d'offset ou chemises ayant diverses tailles; et
un troisième chariot (9) agencé pour être déplacé par des troisièmes moyens d'actionnement le long de ce système de guidage linéaire (2) et sur lequel est installée une tête d'encrage d'offset (10) pourvue de dispositifs pour rapprocher ce troisième chariot (9) de ce cylindre porte-plaque d'offset ou chemise (8a) installé sur ce deuxième chariot (6), et identifiant et établissant une position de travail repère du troisième chariot (9) par rapport au cylindre porte-plaque d'offset ou chemise (8a),
caractérisée en ce que:

le système de guidage linéaire (2) de chaque groupe d'impression (65) est agencé pour guider les mouvements des premier, deuxième et troisième chariots (3, 6, 9) en direction horizontale; et
les structures de support (32) des groupes d'impression (65) qui sont situés de part et d'autre du cylindre d'impression central (1 b) sont empilées ensemble et reliées les unes aux autres et/ou à d'autres éléments structurels pour former cet ensemble structurel (60).

2. La machine à imprimer conformément à la revendication 1, **caractérisée en ce que** cette tête d'encrage d'offset (10) comporte une pluralité de rouleaux encreurs (11,12,13) comprenant un rouleau encreur central (12) assemblé sur un support mobile central (17) et un actionneur linéaire central (18) agencé pour déplacer ce support mobile central (17) et ce rouleau encreur central (12) entre une position déployée, dans laquelle le rouleau encreur central (12) détermine cette position de travail repère pour le troisième chariot (9) lorsque, le reste des rouleaux en-

creurs (11, 13) étant dans une position de retrait, le rouleau encreur central (12) entre en contact avec le cylindre porte-plaque d'offset ou chemise (8a) dans une position de travail, et une position de retrait, dans laquelle le rouleau encreur central (12) ensemble avec le reste de rouleaux encreurs (11, 13) sont hors de contact avec le cylindre porte-plaque d'offset ou chemise (8a) alors que le troisième chariot (9) est maintenu dans cette position de travail repère, et des moyens pour adapter ces autres rouleaux encreurs (11, 13) au périmètre du cylindre porte-plaque d'offset ou chemise (8a).

3. La machine à imprimer conformément à la revendication 1 ou 2, **caractérisée en ce que**:

ces moyens de support du premier chariot (3) sont configurés pour supporter de façon rotatoire et échangeable un rouleau porte plaque flexographique ou chemise (5b) sélectionné d'un ensemble de rouleaux porte-plaque flexographique ou chemises de diverses tailles remplaçant ce cylindre porte-blanchet gainé de caoutchouc ou chemise (5a);
ces moyens de support du deuxième chariot (6) sont configurés pour supporter de façon rotatoire et échangeable un rouleau tramé flexographique ou chemise (8b) remplaçant ce cylindre porte-plaque d'offset ou chemise (8a); et
cette tête d'encrage d'offset (10) est pourvue de dispositifs pour écarter le troisième chariot (9) du deuxième chariot (6) suffisamment pour permettre d'installer un groupe d'encrage flexographique (14) associé de façon opérationnelle à un rouleau tramé flexographique ou chemise (8b) installé sur le deuxième chariot (6).

4. La machine à imprimer conformément à la revendication 2, **caractérisée en ce que** le rouleau encreur central (12) possède un axe de rotation situé, dans cette position de travail, sur le même plan géométrique qu'un premier arbre (4) autour duquel le cylindre porte-blanchet gainé de caoutchouc ou chemise (5a) tourne et un deuxième arbre (7) autour duquel le cylindre porte-plaque d'offset ou chemise (8a) tourne.

5. La machine à imprimer conformément à la revendication 3, **caractérisée en ce que** cette tête d'encrage d'offset (10) comporte un rouleau encreur central (12) ayant un axe de rotation situé, dans une position de travail, sur le même plan géométrique qu'un premier arbre (4) autour duquel un cylindre porte-plaque flexographique ou chemise (5b) tourne et un deuxième arbre (7) autour duquel le rouleau tramé flexographique ou chemise (8b) tourne.

6. La machine à imprimer conformément à la revendication 3, **caractérisée en ce que** ce dispositif d'encrage flexographique (14) est fixé à ce deuxième chariot (6) et ce déplace avec lui.

7. La machine à imprimer conformément à la revendication 3, **caractérisée en ce que** cette structure de support (32) comporte des première et deuxième parois se faisant face (32a, 32b) et le système de guidage linéaire (2) comporte une première paire d'éléments de guidage supérieur et inférieur (26a, 26b) fixés sur cette première paroi (32a) et à laquelle ils sont accouplés, au moins une paire correspondante de coulisseaux supérieur et inférieur (28a, 28b; 30a, 30b, 44a, 44b) fixés à une première extrémité de chacun des premier, deuxième et troisième chariots (3, 6, 9) et une deuxième paire d'éléments de guidage supérieur et inférieur (27a, 27b) fixés à cette deuxième paroi (32b) et à laquelle auquel ils sont accouplés, au moins une paire correspondante de coulisseaux supérieur et inférieur (29a, 29b; 31a, 31b; 45a, 45b) fixés à une deuxième extrémité de chacun des premier, deuxième et troisième chariots (3, 6, 9).

8. La machine à imprimer conformément à la revendication 7, **caractérisée en ce que** les éléments de guidage supérieurs (26a, 27a) des première et deuxième paires d'éléments de guidage sont au-dessus du cylindre porte-blanchet gainé de caoutchouc ou chemise (5a, 8a), respectivement, et les éléments de guidage inférieurs (26b, 27b), des première et deuxième paires d'éléments de guidage sont au-dessous du cylindre porte-blanchet gainé de caoutchouc ou chemise et du cylindre porte-plaque d'offset ou chemise (5a, 8a), et sont suffisamment écartés pour permettre le passage entre eux et à travers une ouverture (33a, 33b) formé dans au moins une des première et deuxième parois (32a, 32b) des cylindre porte-blanchet gainé de caoutchouc ou chemise (5a), cylindre porte-plaque flexographique ou chemise (5b), cylindre porte-plaque d'offset ou chemise (8a) et rouleau tramé flexographique ou chemise (8b) de toutes les tailles d'un format minimum jusqu'à un format maximum.

9. La machine à imprimer conformément à une quelconque des revendications précédentes, **caractérisée en ce qu'**elle comporte un certain nombre de ces groupes d'impression (65) situés sur les cotés opposés du cylindre d'impression central (1b), lequel est agencé pour supporter un substrat en forme d'une bande continue sur laquelle l'impression est réalisée.

10. Un groupe d'impression pour offset à format variable comportant:

une structure de support (32) à laquelle un sys-

tème de guidage linéaire (2) est fixé, cette structure de support (32) étant configurée pour être reliée de façon opérationnelle à un ensemble structurel (60) sur lequel un cylindre d'impression central (1b) est installé rotatoire dans une position fixe;
un premier chariot (3) agencé pour être déplacé par des premiers moyens d'actionnement le long de ce système de guidage linéaire (2) et pourvu de dispositifs de support configurés pour supporter de façon rotatoire et échangeable un cylindre porte-blanchet gainé de caoutchouc ou chemise (5a), sélectionné d'un ensemble de cylindre porte-blanchet gainé de caoutchouc ou chemise de diverses tailles;
un deuxième chariot (6) agencé pour être déplacé par des deuxièmes moyens d'actionnement le long de ce système de guidage linéaire (2) et pourvu de dispositifs de support configurés pour supporter de façon rotatoire et échangeable un cylindre porte-plaque gainé de caoutchouc ou chemise (8a), sélectionné d'un ensemble de cylindres porte-plaque d'offset ou chemises de diverses tailles; et
un troisième chariot (9) agencé pour être déplacé par des troisièmes moyens d'actionnement le long de ce système de guidage linéaire (2) et sur lequel est installée une tête d'encrage d'offset (10) pourvue de dispositifs pour rapprocher ce troisième chariot (9) de ce cylindre porte-plaque d'offset ou chemise (8a) installé sur ce deuxième chariot (6) et identifiant et établissant une position de travail repère du troisième chariot (9) par rapport au cylindre porte-plaque d'offset ou chemise (8a),
caractérisé en ce que:

cette structure de support (32) de groupe d'impression (65) est configurée pour être empilée ensemble et reliée à d'autres structures de support (32) de groupes d'impression analogues (65) de part et d'autres du cylindre d'impression central (1 b) et reliée à d'autres éléments structurels pour former cet ensemble structurel (60); et
le système de guidage linéaire (2) du groupe d'impression (65) est agencé pour guider les mouvements des premier, deuxième et troisième chariots (3, 6, 9) en direction horizontale lorsque la structure de support (32) du groupe d'impression (65) est reliée de façon opérationnelle à l'ensemble structurel (60).

11. Le groupe d'impression conformément à la revendication 10, **caractérisé en ce que** cette tête d'encrage d'offset (10) comporte une pluralité de rouleaux encreurs (11,12,13) comprenant un rouleau encreur central (12) assemblé sur un support mobile central (17) et un actionneur linéaire central (18) agencé pour déplacer ce support mobile central (17) et ce rouleau encreur central (12) entre une position déployée, dans laquelle le rouleau encreur central (12) détermine cette position de travail repère pour le troisième chariot (9) lorsque, les rouleaux encreurs supérieurs et inférieurs (11, 13) étant dans la position de retrait, le rouleau encreur central (12) entre en contact avec le cylindre porte-plaque d'offset ou chemise (8a) dans une position de travail, et une position de retrait, dans laquelle le rouleau encreur central (12) ensemble avec le reste de rouleaux encreurs (11, 13) sont hors de contact avec le cylindre porte-plaque d'offset ou chemise (8a) tandis que le troisième chariot (9) est maintenu dans cette position de travail repère, et des moyens pour adapter ces autres rouleaux encreurs (11, 13) au périmètre du cylindre porte-plaque d'offset ou chemise (8a).

12. Le groupe d'impression conformément à la revendication 11, **caractérisé en ce que**:

ces moyens de support du premier chariot (3) sont configurés pour supporter de façon rotatoire et échangeable un rouleau porte-plaque flexographique ou chemise (5b) sélectionné d'un ensemble de rouleaux porte-plaque flexographique ou chemises de diverses tailles remplaçant ce cylindre porte-blanchet gainé de caoutchouc ou chemise (5a);
ces moyens de support du deuxième chariot (6) sont configurés pour supporter de façon rotatoire et échangeable un rouleau tramé flexographique ou chemise (8b) remplaçant ce cylindre porte-plaque d'offset ou chemise (8a); et
cette tête d'encrage d'offset (10) est pourvue de dispositifs pour écarter le troisième chariot (9) du deuxième chariot (6) suffisamment pour permettre d'installer un dispositif d'encrage flexographique (14) associé de façon opérationnelle à un rouleau tramé flexographique ou chemise (8b) installé sur le deuxième chariot (6).

13. Le groupe à imprimer conformément à la revendication 12, **caractérisé en ce que** le rouleau encreur central (12) possède un axe de rotation situé, dans cette position de travail, sur le même plan géométrique qu'un premier arbre (4) autour duquel le cylindre porte-blanchet gainé de caoutchouc ou chemise (5a) tourne et un deuxième arbre (7) autour duquel le cylindre porte-plaque d'offset ou chemise (8a) tourne.

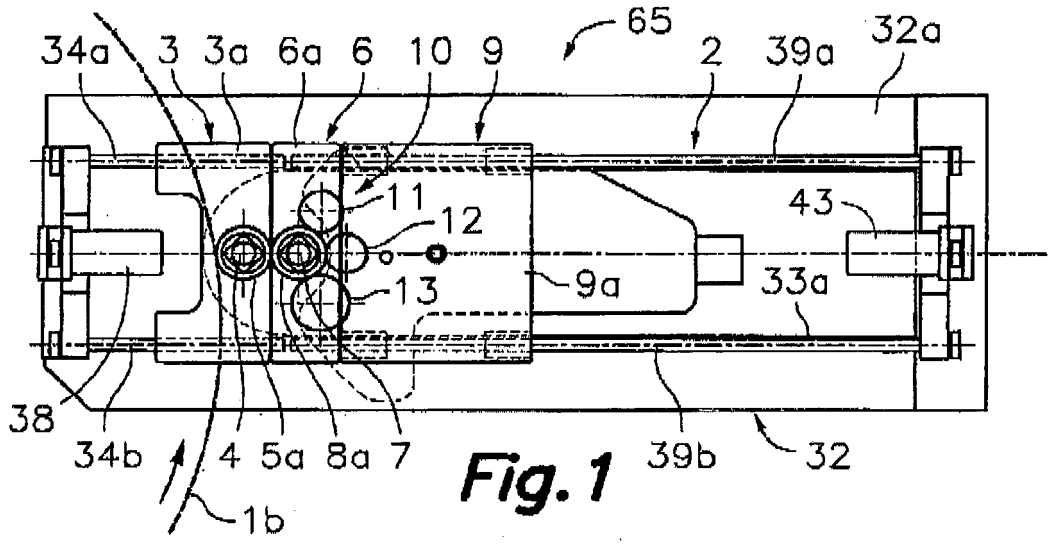


Fig. 1

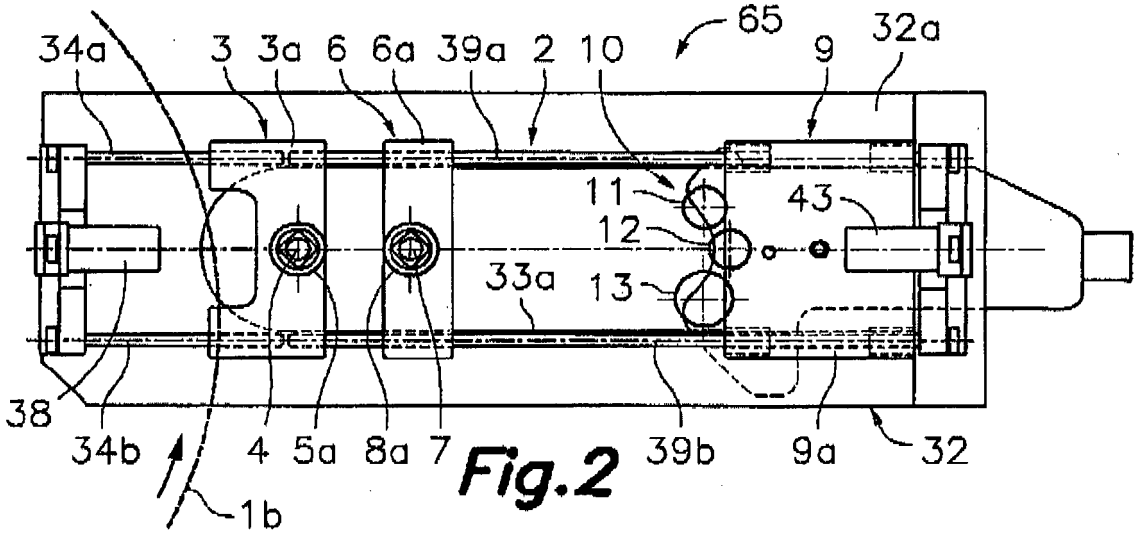


Fig. 2

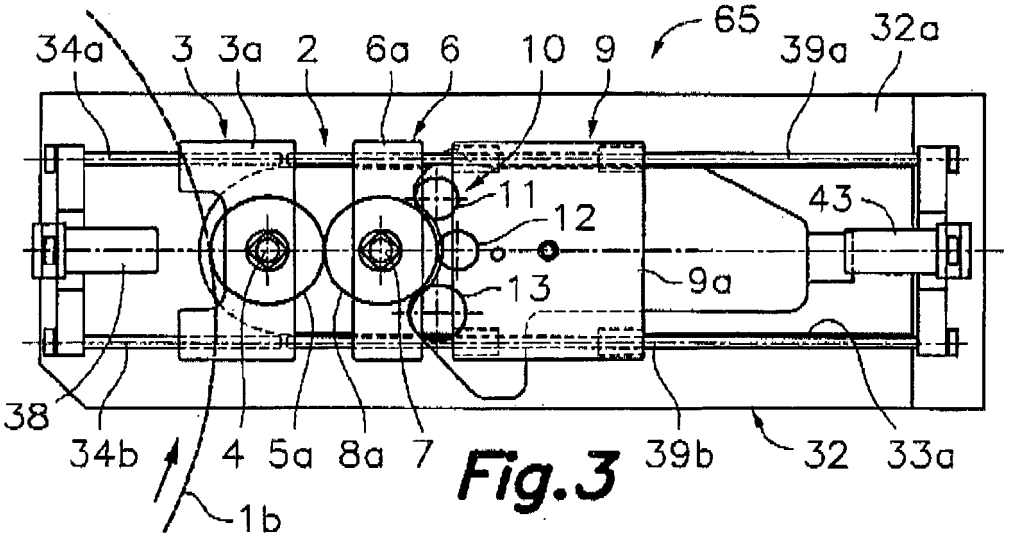


Fig. 3

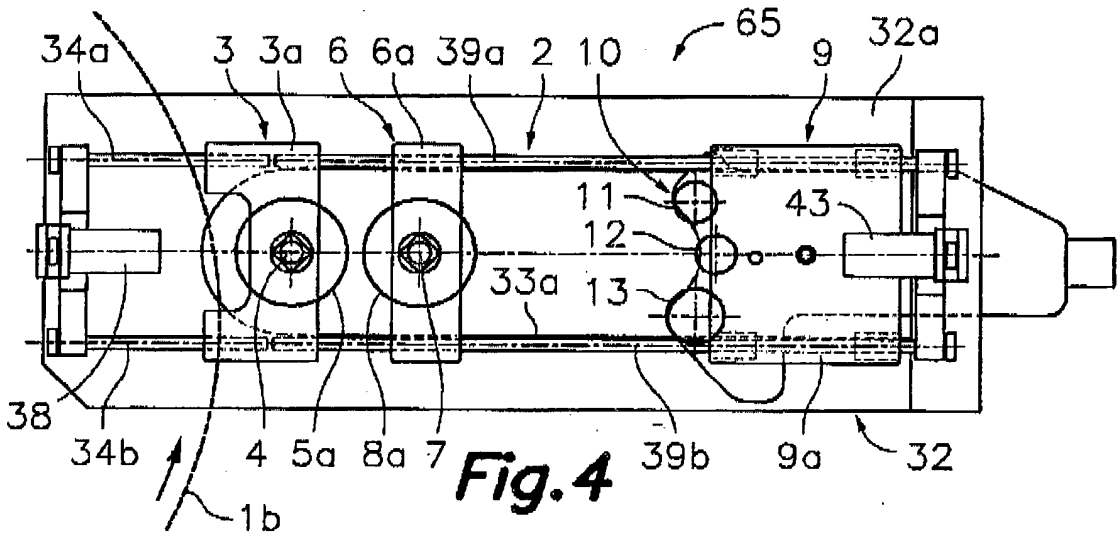


Fig.4

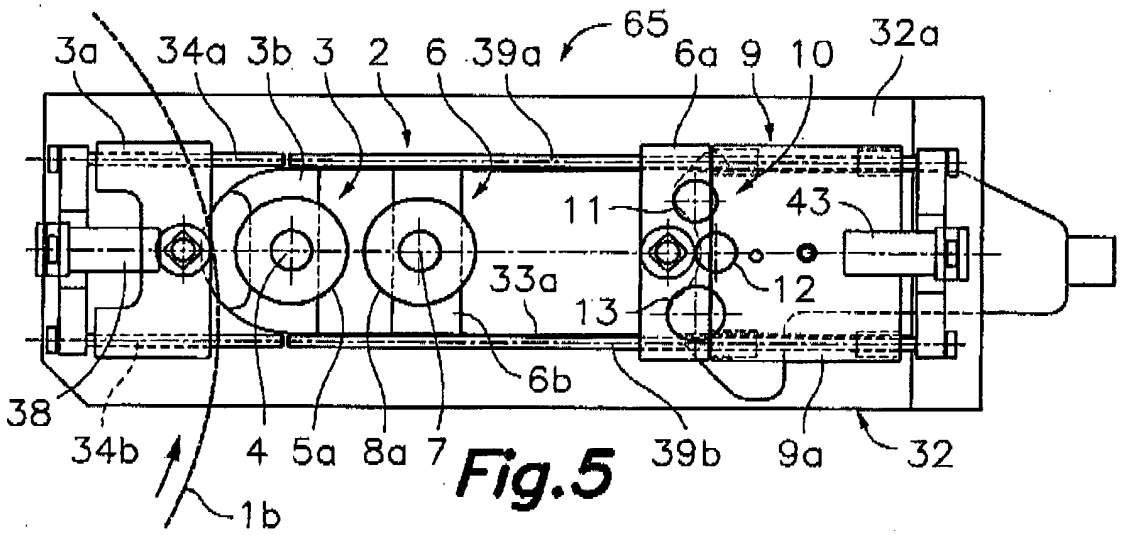


Fig.5

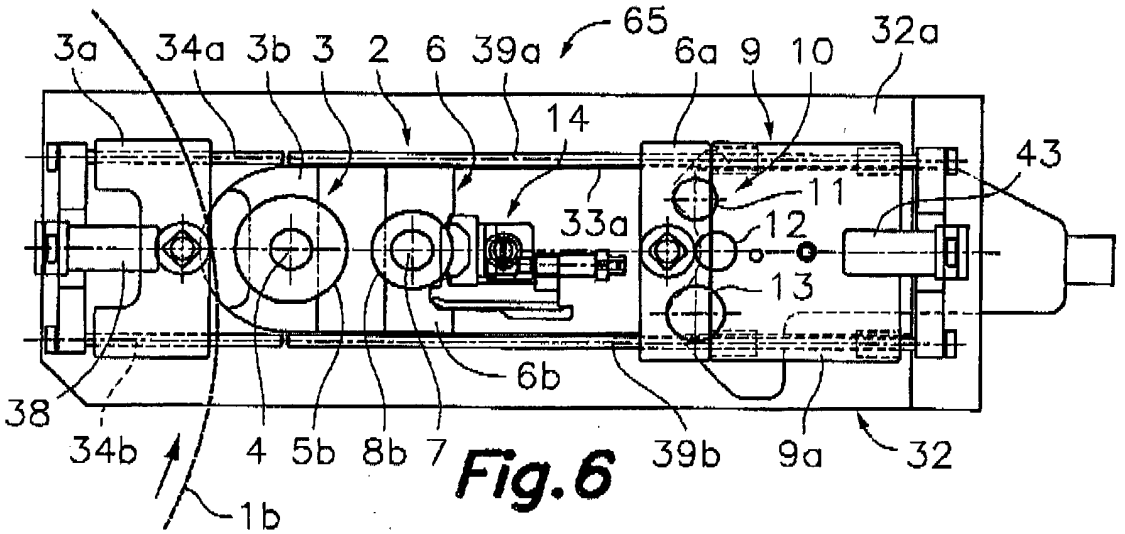


Fig.6

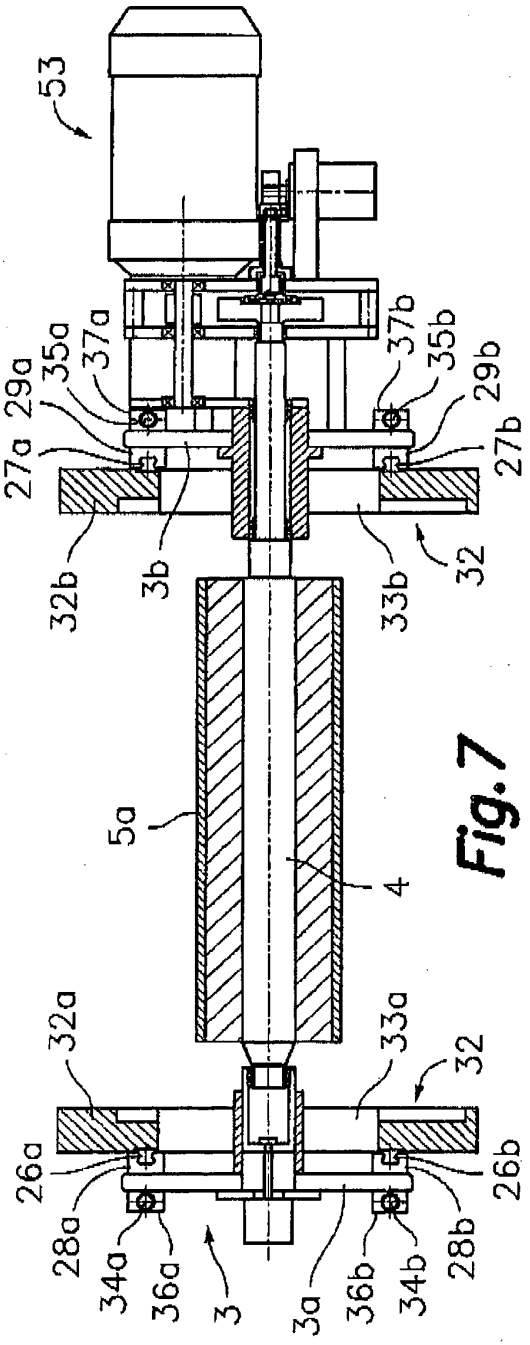
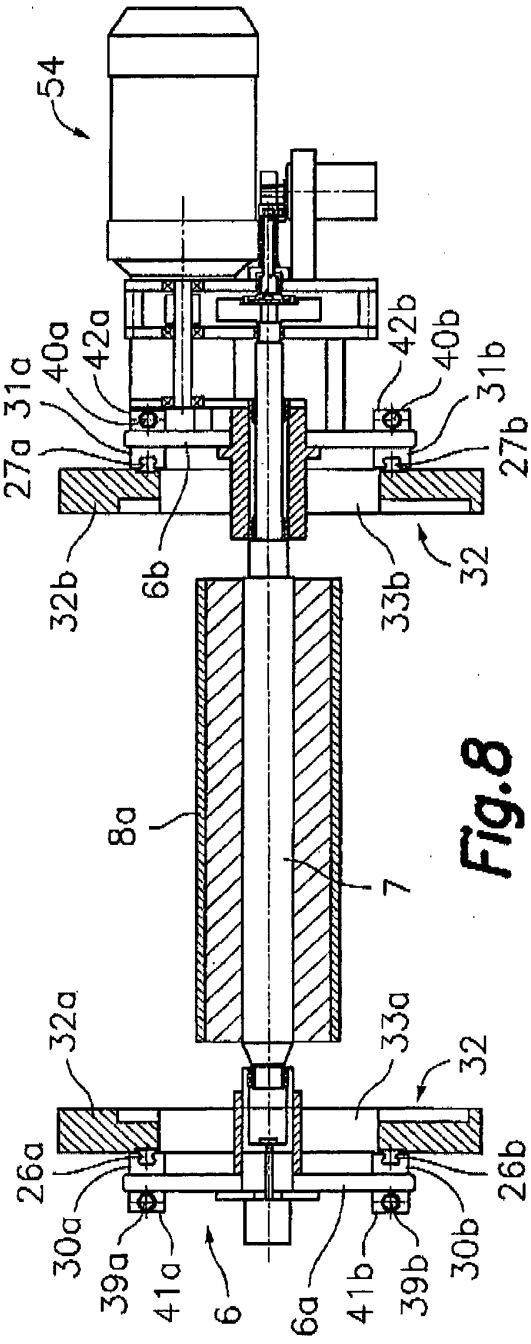

53
29a
35a
37a
37b
35b
29b
27a
27b
32b
3b
33b
32
5a
4
32a
33a
32
26a
26b
28a
34a
36a
3
3a
36b
34b
28b

Fig.7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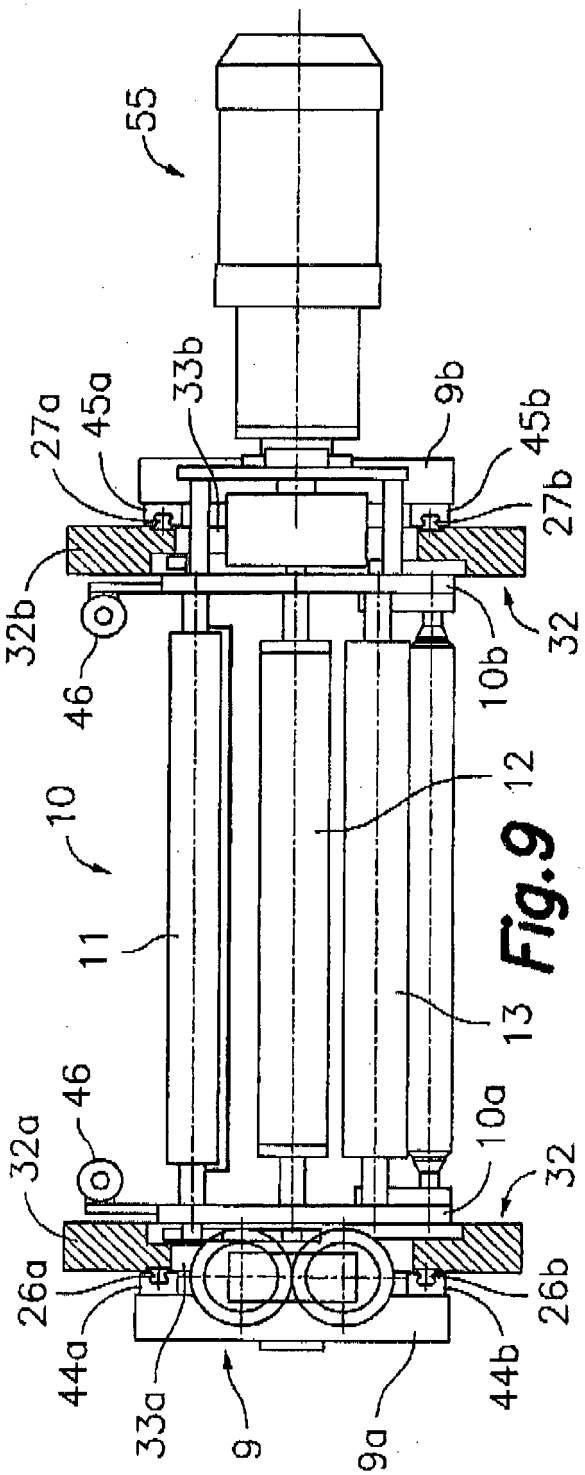
31a
40a
42a
42b
40b
31b
27a
27b
32b
6b
33b
32
8a
7
32a
33a
32
26a
26b
30a
39a
41a
6
6a
41b
39b
30b

Fig.8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9b
27a
45a
45b
27b
32b
46
10b
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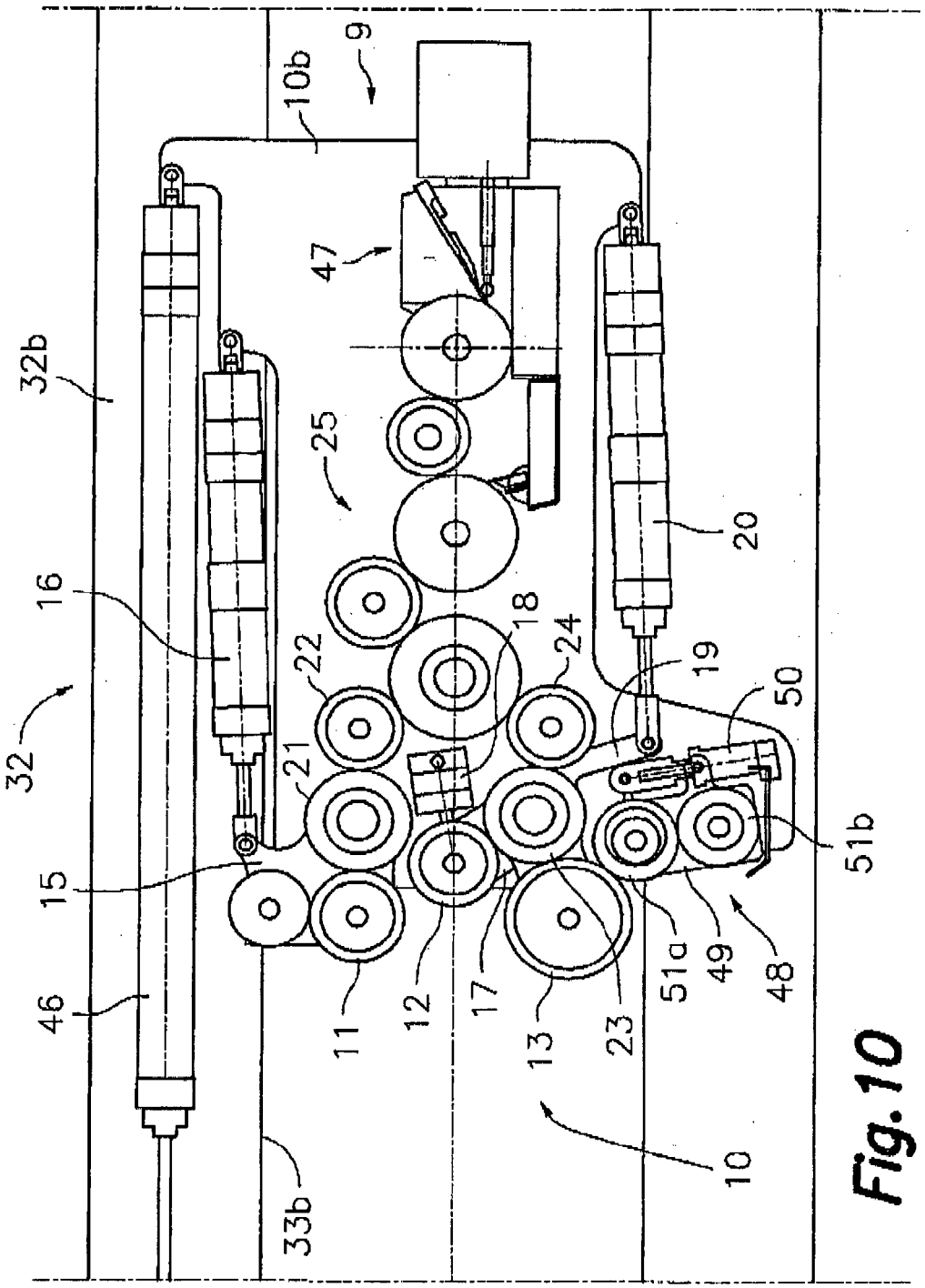
10a
32
26a
26b
44a
44b
33a
9
9a

Fig.9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32b
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13
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51a
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48
10
33b

Fig.10

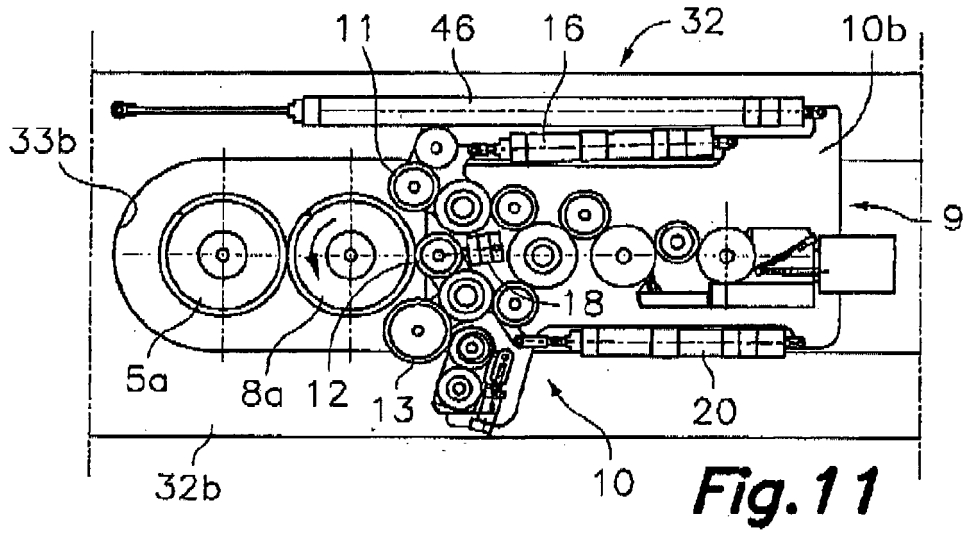

Fig.11

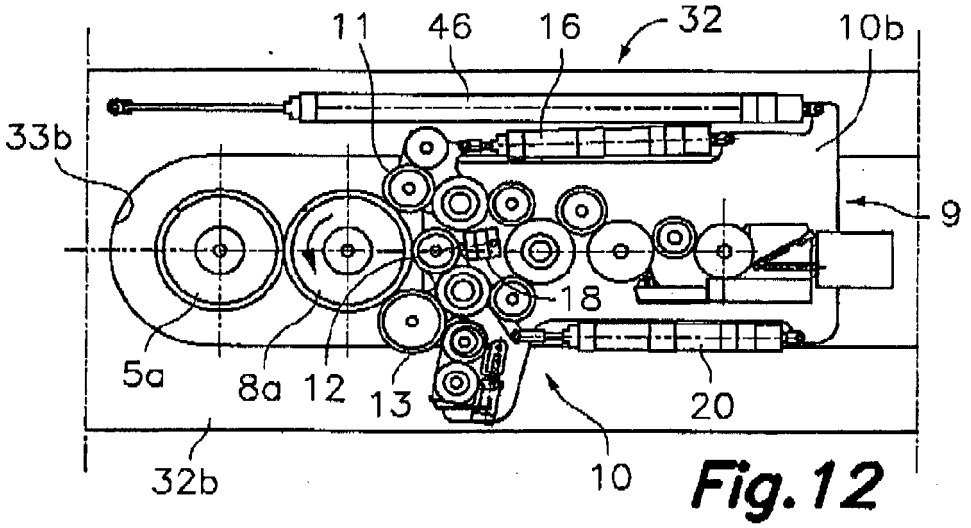

Fig.12

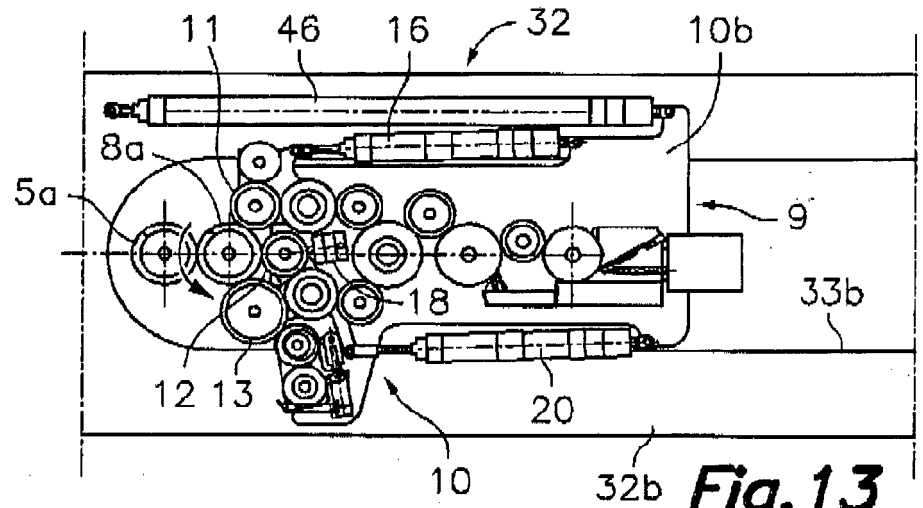

Fig.13

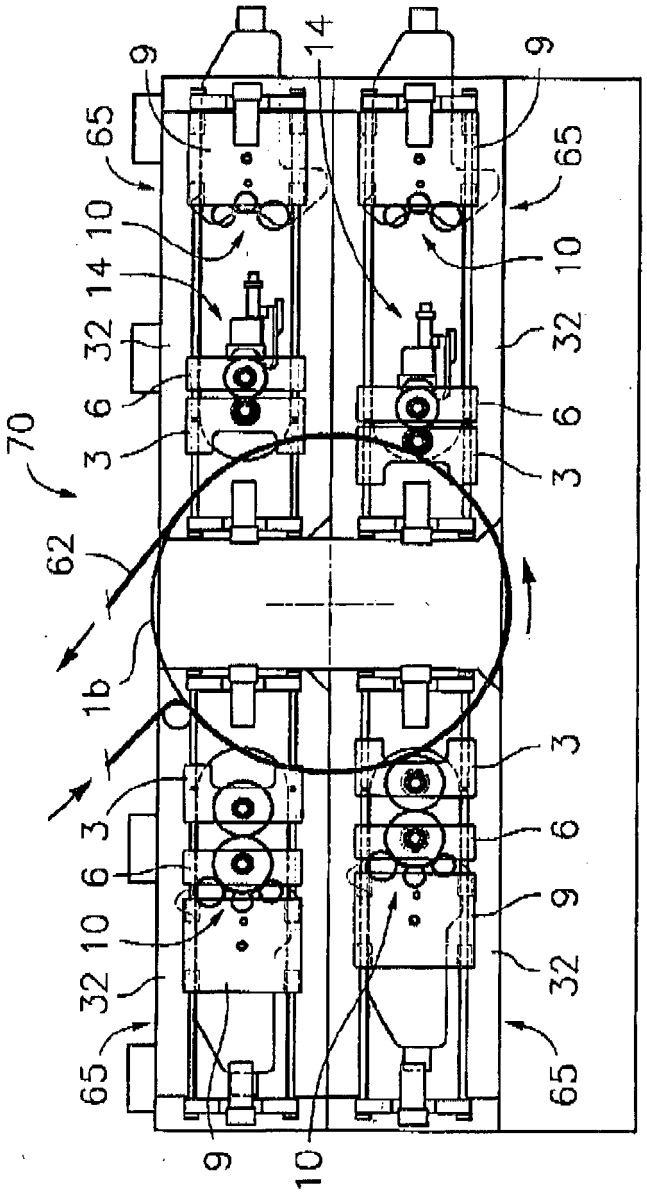

Fig.14

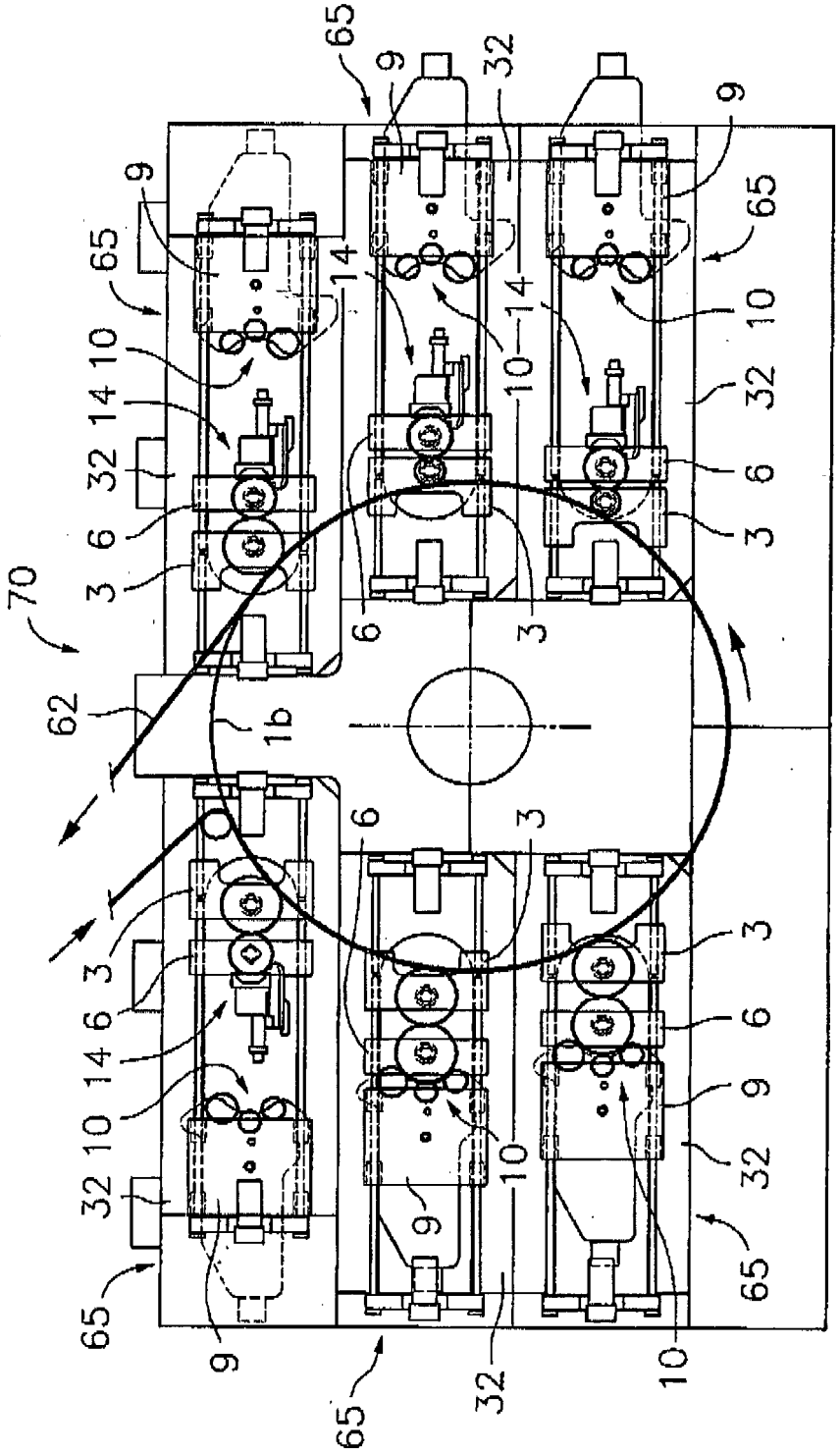

Fig.15

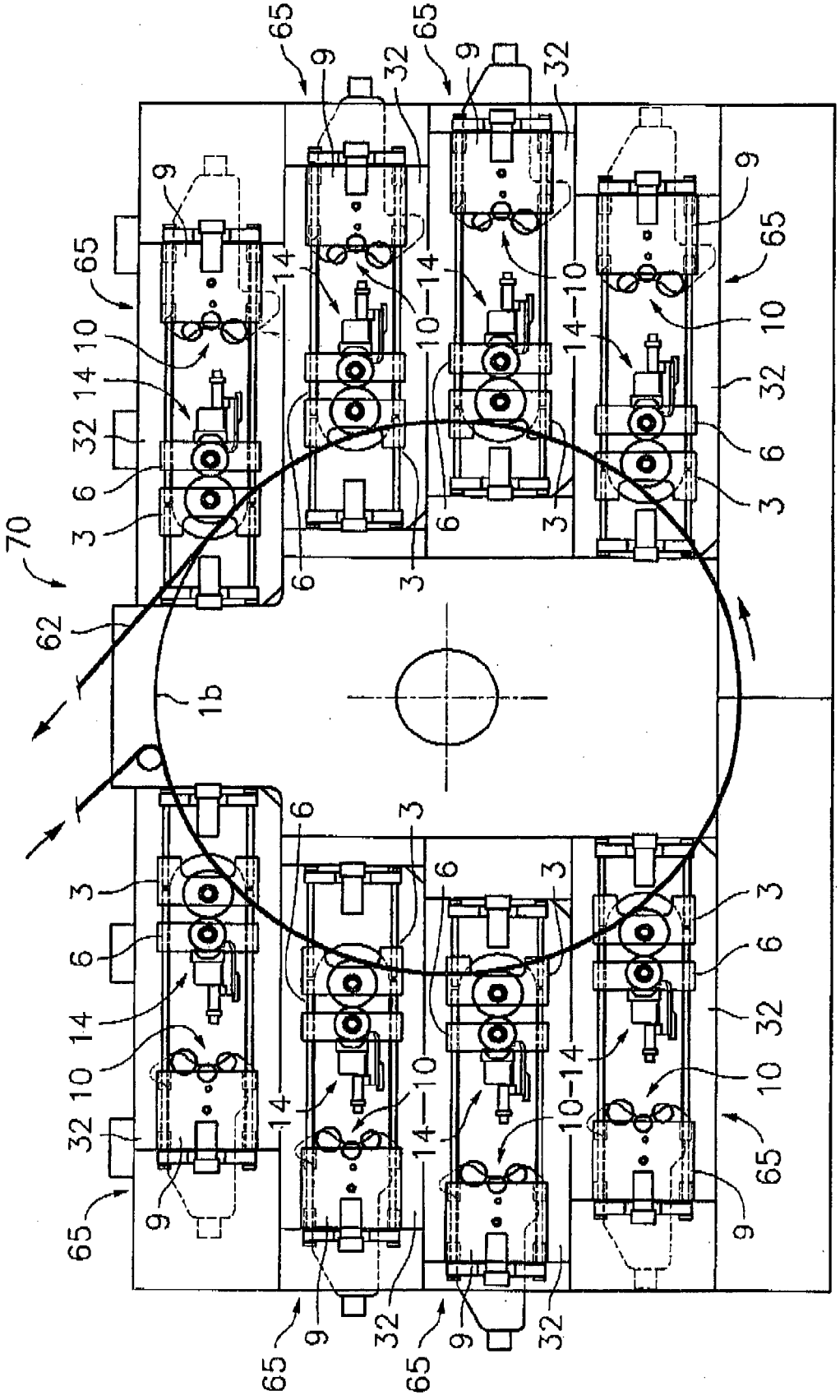

Fig.16

REFERENCES CITED IN THE DESCRIPTION

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